

REMARKS

The present invention is directed to a non-solid polyurethane structural adhesive composition comprising (1) a controlled structure isocyanate terminated prepolymer composition, and (2) a curative for the isocyanate groups. The prepolymer composition consists essentially of at least 80 wt% of a stoichiometric "perfect" prepolymer and contains less than 2 wt% unreacted polyisocyanate monomer.

Although Claim 1 is written in Jepson format in which the preamble recites that which is well known in the art, it is the combination of all the elements comprising the preamble and the improvement clause that is examined for patentability. Such combination defines the subject matter being claimed, i.e., the defined structural adhesive comprising the controlled structure isocyanate prepolymer and the curative. The claimed subject matter is examined for novelty. It is the "subject matter as a whole" that is assessed for nonobviousness. The "subject matter as a whole" includes the defined elements and their properties and advantages.

The advantages afforded by the claimed subject matter as a whole, include improved cured adhesive strength, improved ultimate adhesive strength, and improved ambient, or room temperature, development of strength. Examples 1 and 2 compare structural adhesives using prepolymer compositions meeting the two defined criteria, namely the wt% perfect prepolymer and the wt% residual polyisocyanate monomer, with prepolymer compositions not meeting these requirements. These prepolymer compositions were compared in a structural adhesive composition containing the prepolymers of Table 1 and curatives Arcol PPG 2025 and Quadrol. Both MDI and TDI based prepolymers were evaluated.

Table 2 shows that Prepolymer 5 according to the invention gave superior shear strength compared to Prepolymer 6 after room temperature curing and aging for one day and seven days as well as after heat cure and then room temperature aging for one day and seven days. Table 3 shows that structural adhesives containing Prepolymers 1 and 3 according to the invention showed faster room temperature development and strength after one day and superior % cure (1d/7d) than those adhesives containing Prepolymers 2 and 4 which are outside the claim language. Such an improvement in shear strength of the structural adhesives of the invention whether cured at room temperature or heat cured is surprising and unexpected because it is not taught or suggested in any of the prior art.

THE REJECTION

Claims 1-12 were rejected under 103(a) as being unpatentable over the Admitted Prior Art (APA) in view of US 5,880,167 (Krebs, et al.). Applicants submit that such 103(a) rejection is untenable in that the prior art as combined by the Examiner neither teaches nor suggests Applicants' claimed subject matter as a whole, namely, the defined non-solid structural adhesive manifesting the above-stated property advantages.

APA is deficient with respect to any teaching or suggestion of a structural adhesive containing a polyurethane prepolymer reaction product consisting essentially of at least 80 wt% perfect prepolymers.

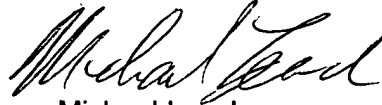
The examples in the present Application show the need for the 80 wt% perfect prepolymers and the low free isocyanate monomer content to afford the surprising advantages of improved cured adhesive strength, improved ultimate adhesive strength, and improved ambient, or room temperature, development of strength. Such unexpected results are presented in the data in Tables 2 and 3 of the present Application.

The deficiency of APA with regard to the combination of the required amount of perfect prepolymer and the limit on the amount of free isocyanate monomer in the prepolymer reaction product is not remedied by the Krebs reference. While Krebs teaches low free monomer content for environmental, health and safety reasons, there is nothing in Krebs with regard to its combination with the requisite amount of perfect prepolymer to afford the advantages demonstrated in Applicants' examples.

Furthermore, although there may exist a prepolymer reaction product composition in the prior art that fulfills the perfect prepolymer and free isocyanate monomer limitations does not necessarily negate nonobviousness. There must also be a suggestion or direction in the art to use such composition to the exclusion of all the other, equally available low free isocyanate monomer-containing prepolymer compositions that do not contain the required amount of perfect prepolymer. Applicants submit there is no suggestion in the art to use such prepolymer composition to afford the stated surprising advantages of the claimed structural adhesive composition.

In view of the above remarks, Applicants request reconsideration of this 103a rejection based on APA in view of Krebs and its withdrawal. Believing the Application is in condition for allowance, Applicants solicit an action to that effect.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Michael Leach", written in a cursive style.

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